APPENDIX D

PARAGRAPHS 12 AND 14 DESIGN AND OPERATING CRITERIA FOR NOx REDUCING SYSTEMS, WET GAS SCRUBBERS, AND DRY GAS SCRUBBERS

All air pollution control equipment designed pursuant to this appendix will be designed and built in accordance with regulatory requirements that may apply.

I. Selective Non-Catalytic Reduction

A. Design Considerations

1. Reductant Addition

a. Reductant Type (e.g. Anhydrous Ammonia, Aqueous Ammonia, or Urea) and Addition Rate

b. Enhanced Reductant Type (e.g. Hydrogen) and Addition Rates

c. Diluent Type and Rate

d. Flow Distribution Manifold

e. Injection Grid / Nozzles

i. Number
ii. Size
iii. Location
iv. Controls

f. Ammonia Slip

2. Flue Gas Characteristics

a. Pre-SNCR/Post-SNCR NOx Concentration

b. Flue Gas Volumetric Flow

c. Temperature Profile

d. SO_2/SO3 Concentrations

e. CO/H2O/O2 Concentrations

f. Particulate Matter Loading and Characteristics

3. Efficiency

a. Designed NOx Concentration in Flue Gas

b. Designed Removal Efficiency

B. Operating Considerations

1. Reductant Addition

a. Reductant Addition Rates

b. Ammonia Slip

2. Flue Gas Characteristics

a. Outlet NOx Concentration

b. Flue Gas Volumetric Flow

c. Temperature Profile

d. SO_2 Concentrations

e. CO/H2O/O2 Concentrations

f. Particulate Loading and Characteristics

3. Efficiency

a. Actual Outlet NOx Concentration

b. Actual Removal Efficiency

II. O3 System

A. Design Considerations

1. Ozone Addition

a. Addition Rates

b. Flow Distribution Manifold

c. Injection Grid/Nozzles

i. Number
ii. Size
iii. Location
iv. Controls

d. Ozone Slip

2. Flue Gas Characteristics

a. Inlet/Outlet NOx Concentration

b. Flue Gas Volumetric Flow

c. Temperature Range

d. SO_2/SO3 Concentrations

e. CO/H2O/O2 Concentrations

f. Particulate/~~Ash~~ Loading and Characteristics

3. Efficiency

a. Designed to Outlet NOx Concentration

b. Designed to Removal Efficiency

B. Operating Considerations

1. Ozone Addition

a. Addition Rates

b. Ozone Slip

2. Flue Gas Characteristics

a. NOx Concentration

b. Flue Gas Volumetric Flow

c. Temperature Range

d. SO_2/SO3 Concentrations

e. CO/H2O/O2 Concentrations

f. Particulate Loading and Characteristics

3. Efficiency

a. Actual Outlet NOx Concentration

b. Actual Removal Efficiency

III. Dry Gas Scrubber

A. Design Considerations

1. Absorber Vessel

a. Volume

b. Dimensions

c. Pressure Drop

d. Internal Configuration

e. Location in Process Train

2. Absorbent

a. Type (Lime or other)

b. Addition Rate

3. Flue Gas Characteristics

a. Inlet/Outlet SO_2/SO3 Concentrations

b. Flue Gas Volumetric Flow

c. Inlet/Outlet Temperature Range

d. Inlet/Outlet Particulate Loading and Characteristics

4. Efficiency

a. Designed to Outlet SO_2/SO3 Concentration

b. Designed to Removal Efficiency

5. Safety Considerations

B. Operating Considerations

1. Absorbent

a. Type (Lime or other)

b. Addition Rate

2. Flue Gas Characteristics

a. Outlet SO_2

b. Flue Gas Volumetric Flow

c. Inlet/Outlet Temperature Range

d. Inlet/Outlet Particulate Loading and Characteristics

e. Effect on downstream baghouse

f. Pressure drop across the absorbent bed.

3. Efficiency

a. Outlet SO_2 Concentration

b. Actual Removal Efficiency